

REMARKS

Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-14, 16, 18, and 20-21 and are currently being prosecuted. The Examiner is respectfully requested to reconsider his rejections in view of the amendments and remarks as set forth below.

Rejections Under 35 USC §112

Claim 12 stands rejected under 35 USC §112, second paragraph as being indefinite. This rejection is respectfully traversed.

Claim 12 has now been amended to further describe this feature and to make the language definite. This language refers to the embodiment shown in Figure 19 and described on page 13 of the specification. The time period when a cell is discharging is referred to as the falling time at line 24, page 13. The time following this, during which the cell remains discharged, is known as the black time as discussed on line 20 of page 13. Applicants submit that this rejection is now overcome.

Rejections Under 35 USC §102

Claims 1, 4, 5, 8, and 11-18 stand rejected under 35 USC §102 as being anticipated by Takahashi (USP 6,297,792). This rejection is respectfully traversed.

The Examiner points out that the Takahashi reference shows a liquid crystal display including liquid crystal pixel cells arranged at intersections between scanning lines and data

lines in a matrix driven within film transistors. The Examiner also states that Takahashi teaches applying a first signal for charging during the beginning of a frame and applying a second signal for discharging during an end of the frame. The Examiner especially points out Figures 8 and 9 and columns 14, 15, and 19.

Applicants submit that Takahashi does not anticipate the present claims. While this reference shows both a charging mode and a discharging mode with gate signals being applied at the beginning of each mode, the reference does not teach all of the features of the presently claimed invention. The Examiner is referred to Figure 8(a) which shows the signals supplied to the data lines. As seen there, the applied signals are either at voltage level $VH/2$ or $-VH/2$. This signal scheme is the same in both the charging and discharging mode.

However, in the present invention, the data signals are different in the two halves of each frame. Thus, during the first half of each frame, the signal is either positive or negative. In the last half of each frame, the signal is always zero. This is seen, for example, in Figure 6. Claim 1 has been amended to now describe the method as including the steps of applying a first signal through the data lines for charging and applying the second signal which is different from the first signal through the data lines for discharging. This differs from the Takahashi reference where the same signals are applied during each mode. As explained, a different voltage level is used in the end of the frame than in the beginning of the frame. Takahashi discloses charging pixels with a first voltage during a half period of first horizontal period and discharging pixels with a second selective voltage during a half period of second horizontal period. However, Takahashi fails to teach

applying a first voltage to charge pixels at the beginning of the frame and applying a second voltage to discharge pixels during the ending of the frame. Further, Takahashi fails to teach or suggest activating TFTs at least twice during a frame or applying at least two gate pulses to the TFT during a frame. Accordingly, Takahashi does not teach the invention as described in claim 1.

Claim 5 describes the driving apparatus including a data driver which applies a first signal during a beginning of the frame for charging and applying a second signal which is different from the first signal for discharging during the ending of the frame. This claim also includes the description of the gate driver as applying two gate pulses to the gate lines to apply these two signals to the cells. Applicants submit that Takahashi does not show that the two different signals are different from each other during these two modes. Accordingly, Applicants submit that this claim is likewise allowable over Takahashi.

Claim 11 describes a method of operating a liquid crystal cell including charging the cell during a beginning portion of the frame and completely discharging the cell beforehand of the frame. As indicated above, these features are not described at all in the Takahashi reference and accordingly, claim 11 is considered to be allowable.

Claim 12 further describes the method of claim 11 and further describes the relationship between the first time period during which the discharging takes place and the second time period during which the cell remains discharged.

Claim 13 has been amended to point out that the charges applied to the pixel electrode are through the data lines. This claim further describes a different signal applied

during the beginning and ending of a frame and is also allowable for the same reason recited above.

Claim 14 has been amended to include the limitations of claims 15 and 17 which have been canceled. Claim 14 now includes a description of the charges applied during the beginning and ending of a frame in a similar manner to claim 13. Accordingly, this claim is also considered to be allowable.

Claim 18 now includes the limitations previously found in claim 19. This claim now describes the gate driver as including a plurality of gate drive circuits connected in series. Since the Takahashi reference does not include this feature, Applicants submit that claim 18 is allowable thereover.

Claims 2-4, 6-8 and 16 depend from these allowable claims and as such are also considered to be allowable. In addition these claims recite other features which make them additionally allowable.

Claim Rejections – 35 USC §103

Claims 2, 3, 6, and 7 stand rejected under 35 USC §103 as being obvious over Takahashi in view of Miwa et al. (USP 6,369,469). This rejection is respectfully traversed.

The Examiner cited the Miwa reference to show the use of a ferro-electric liquid crystal, a twisted nematic liquid crystal and a response time of less than 10ms. However, Miwa et al. fails to teach or suggest charging the pixels at the beginning of the frame and discharging the pixels during the ending of the frame. However, even if this reference does

teach these features, claims 2, 3, 6, and 7 are still allowable based on their dependency from allowable independent claims 1 and 5.

Claim 19 stands rejected under 35 USC §103 as being obvious over Takahashi in view of Kabota et al. (USP 5,907,313). This rejection is respectfully traversed.

Claim 19 has been canceled, rendering this rejection moot. However, its limitations have been added to claim 18. The Examiner suggests that Kabota shows a plurality of gate drivers connected in a series as shown in Figure 9. However, Applicants submit that this reference does not show that gate drivers connected in series. The Examiner is referred to column 8, lines 48-51 where Figure 9 is further discussed. As stated there, the output of the scanning line driver power selector 913 is supplied in parallel to both the counter section 905 and the decoder section 906. Further at column 8, line 60, the power selector 913 sequentially selects a counter section 905 and a decoder section 906. Thus, although each of these sections may be serially connected within the section, the sections themselves are connected in parallel. Applicants submit that claim 18 is allowable over the combination of references.

Claim 9 has been rewritten in independent form including all of the limitations of claim 5 from which it originally depended. Accordingly, claims 9 and 10 are considered to be allowable.

Claims 20-21 have been added which describe the two signals being applied through the data lines and being different from each other. These claims are considered to be additionally allowable.

Conclusion

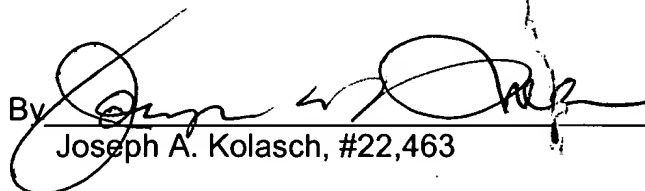
In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner either alone or in combination. In view of this, reconsideration of the rejection and allowance of all of the claims are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By 
Joseph A. Kolasch, #22,463

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

 JAK/RFG/jeb/ags
2658-0252P